



- ☐ Tentative Specification
☐ Preliminary Specification
☒ Approval Specification

MODEL NO.: V580HK1

SUFFIX: LD6

Ver. C1

Customer :

APPROVED BY

SIGNATURE

Name / Title

Note

Please return 1 copy for your confirmation with your signature and comments.

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**REVISION HISTORY**

| Version | Date | Page(New) | Section | Description |
|------------------|---------------|-----------|---------|---|
| V 0.0 | Aug. 16, 2012 | All | All | Tentative Specification was first issued. |
| www.panelook.com | | | | |

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V580HK1-LD6 is a 58" TFT Liquid Crystal Display module with LED Backlight unit and 4ch-LVDS interface. This module supports 1920 x 1080 Full HDTV format and can display true 1.07G colors (8-bits+FRC). The driving board module for backlight is built-in.

1.2 FEATURES

- High brightness 350nits
- High contrast ratio 4000:1
- Fast response time Gray to Gray typical 6.5ms
- High color saturation NTSC 72%
- Full HDTV (1920 x 1080 pixels) resolution, true HDTV format
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface
- Optimized response time for 120 Hz frame rate
- Viewing Angle : 178(H)/178(V) (CR>20) VA Technology
- Ultra wide viewing angle: Super MVA technology
- RoHs compliance
- T-con input frame rate: 100Hz/120Hz, output frame rate: 100Hz/120Hz

1.3 APPLICATION

- Standard Living Room TVs.
- Public Display Application.
- Home Theater Application.
- MFM Application.

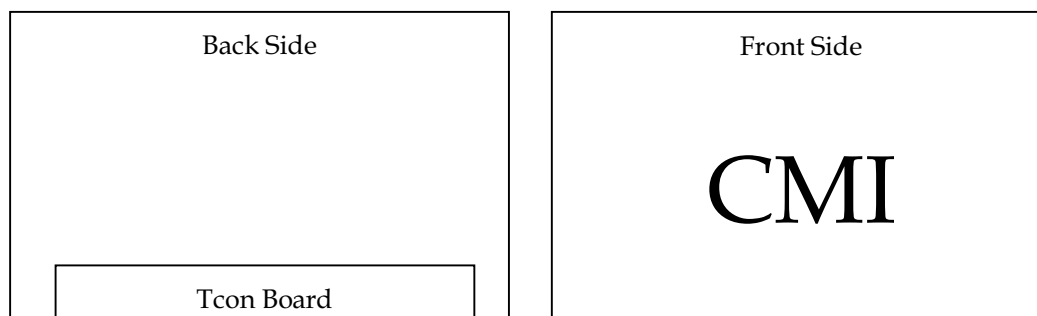
1.4 GENERAL SPECIFICATIONS

| Item | Specification | Unit | Note |
|------------------------|---------------------------------------|-------|------|
| Active Area | 1270.08(H) x 721.44(V) (58" diagonal) | mm | (1) |
| Bezel Opening Area | 1275.3 (H) x 726.7(V) | mm | |
| Driver Element | a-si TFT active matrix | - | - |
| Pixel Number | 1920 x R.G.B. x 1080 | pixel | - |
| Pixel Pitch(Sub Pixel) | 0.2205(H) x 0.6680(V) | mm | - |
| Pixel Arrangement | RGB vertical stripe | - | - |
| Display Colors | 1.07G(8-bit+FRC) | color | - |
| Display Operation Mode | Transmissive mode / Normally black | - | - |
| Surface Treatment | Anti-Glare coating (Haze 1%) | - | (2) |
| Rotation Function | Unachievable | | (3) |
| Display Orientation | Signal input with "CMI" | | (3) |

Note (1) Please refer to the attached drawings in chapter 9 for more information about the front and back outlines.

Note (2) The spec of the surface treatment is temporarily for this phase. CMI reserves the rights to change this feature.

Note (3)



1.5 MECHANICAL SPECIFICATIONS

| Item | | Min. | Typ. | Max. | Unit | Note |
|-----------------------|----------------|--------|--------|--------|------|--------------------|
| Module Size Weight | Horizontal (H) | 1288.8 | 1290.3 | 1291.8 | mm | (1), (2) |
| | Vertical (V) | 743.2 | 744.7 | 746.2 | mm | (1), (2) |
| | Depth (D) | 50.3 | 51.8 | 53.3 | mm | To Rear |
| | | 60.8 | 62.3 | 63.8 | mm | To converter cover |
| | Weight | | 16.15 | | Kg | |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Module Depth does not include connectors.

2. ABSOLUTE MAXIMUM RATINGS**2.1 ABSOLUTE RATINGS OF ENVIRONMENT**

| Item | Symbol | Value | | Unit | Note |
|-------------------------------|------------------|-------|------|------|----------|
| | | Min. | Max. | | |
| Storage Temperature | T _{ST} | -20 | +60 | °C | (1) |
| Operating Ambient Temperature | T _{OP} | 0 | 50 | °C | (1), (2) |
| Shock (Non-Operating) | S _{NOF} | - | 30 | G | (3), (5) |
| Vibration (Non-Operating) | V _{NOF} | - | 1.0 | G | (4), (5) |

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40^\circ\text{C}$).

(b) Wet-bulb temperature should be 39°C Max. ($T_a > 40^\circ\text{C}$).

(c) No condensation.

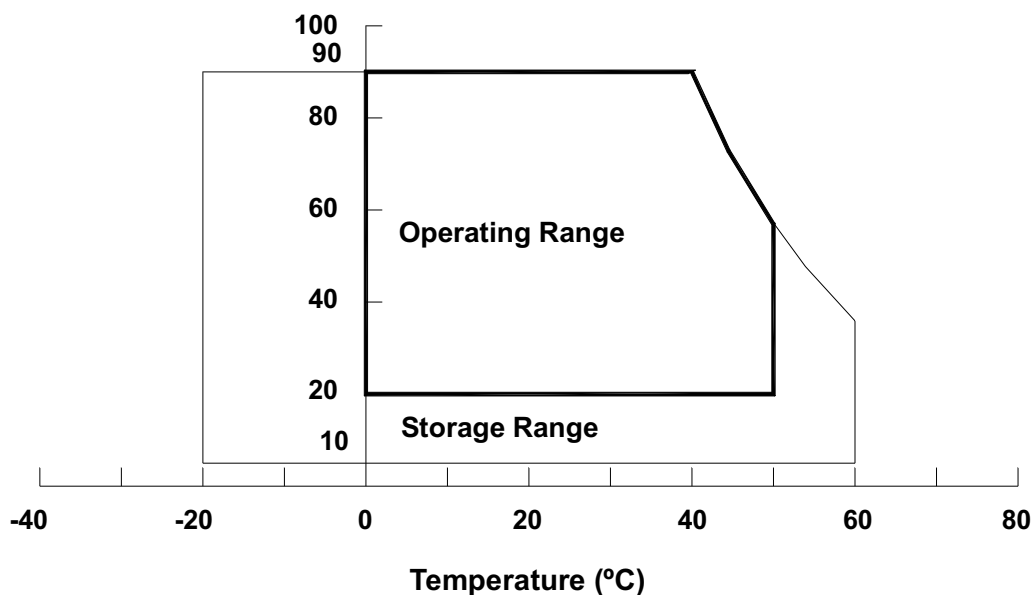
Note (2) Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65°C . The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for $\pm X$, $\pm Y$, $\pm Z$.

Note (4) 10 ~ 200 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Relative Humidity (%RH)



2.2 PACKAGE STORAGE

When storing modules as spares for a long time, the following precaution is necessary.

- (a) Do not leave the module in high temperature, and high humidity for a long time, It is highly recommended to store the module with temperature from 0 to 35 °C at normal humidity without condensation.
- (b) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

2.3 ELECTRICAL ABSOLUTE RATINGS

2.3.1 TFT LCD MODULE

| Item | Symbol | Value | | Unit | Note |
|----------------------|-----------------|-------|------|------|------|
| | | Min. | Max. | | |
| Power Supply Voltage | V _{CC} | -0.3 | 13.5 | V | (1) |
| Logic Input Voltage | V _{IN} | -0.3 | 3.6 | V | |

2.3.2 BACKLIGHT CONVERTER UNIT

| Item | Symbol | Test Condition | Min. | Type | Max. | Unit | Note |
|-------------------|----------------|----------------|------|------|------|-----------------|------|
| Light Bar Voltage | V _W | Ta = 25 °C | - | - | 165 | V _{DC} | (1) |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

3. ELECTRICAL CHARACTERISTICS

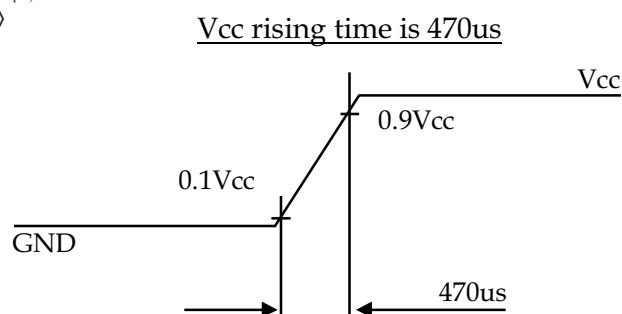
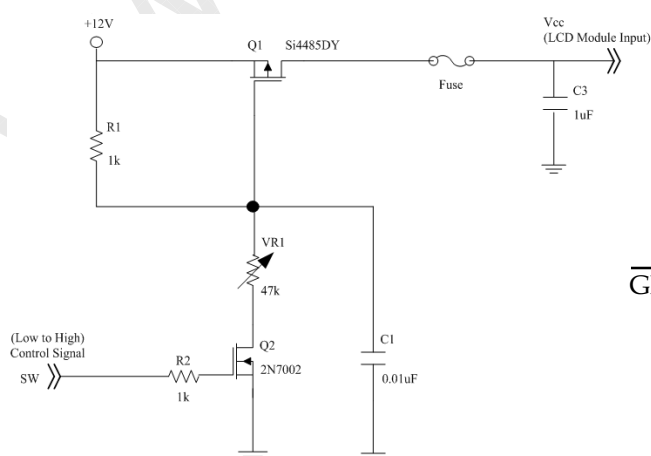
3.1 TFT LCD MODULE ($T_a = 25 \pm 2\text{ }^{\circ}\text{C}$)

| Parameter | | Symbol | Value | | | Unit | Note |
|----------------------|---|------------|-------|-------|-------|------|------|
| | | | Min. | Typ. | Max. | | |
| Power Supply Voltage | | V_{CC} | 10.8 | 12 | 13.2 | V | (1) |
| Rush Current | | I_{RUSH} | — | — | 3.51 | A | (2) |
| Power Consumption | White Pattern | P_T | — | 6.05 | 7.22 | W | (3) |
| | Horizontal Stripe | P_T | — | 18.32 | 21.99 | W | |
| | Black Pattern | P_T | — | 5.73 | 6.86 | W | |
| Power Supply Current | White Pattern | — | — | 0.50 | 0.60 | A | |
| | Horizontal Stripe | — | — | 1.53 | 1.83 | A | |
| | Black Pattern | — | — | 0.48 | 0.57 | A | |
| LVDS interface | Differential Input High Threshold Voltage | V_{LVTH} | +100 | — | +300 | mV | (4) |
| | Differential Input Low Threshold Voltage | V_{LVTL} | -300 | — | -100 | mV | |
| | Common Input Voltage | V_{CM} | 1.0 | 1.2 | 1.4 | V | |
| | Differential input voltage (single-end) | $ V_{ID} $ | 200 | — | 600 | mV | |
| | Terminating Resistor | R_T | — | 100 | — | ohm | |
| CMIS interface | Input High Threshold Voltage | V_{IH} | 2.7 | — | 3.3 | V | |
| | Input Low Threshold Voltage | V_{IL} | 0 | — | 0.7 | V | |

Note (1) The module should be always operated within the above ranges.

The ripple voltage should be controlled under 10% of V_{CC} (Typ.)

Note (2) Measurement condition:



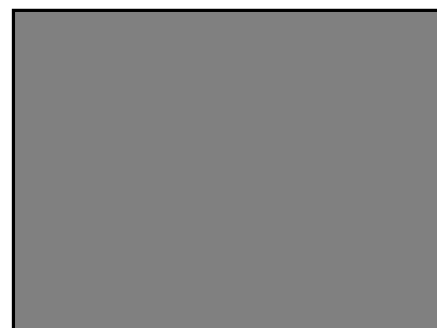
Note (3) The specified power consumption and power supply current is under the conditions at $V_{CC} = 12\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 120\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



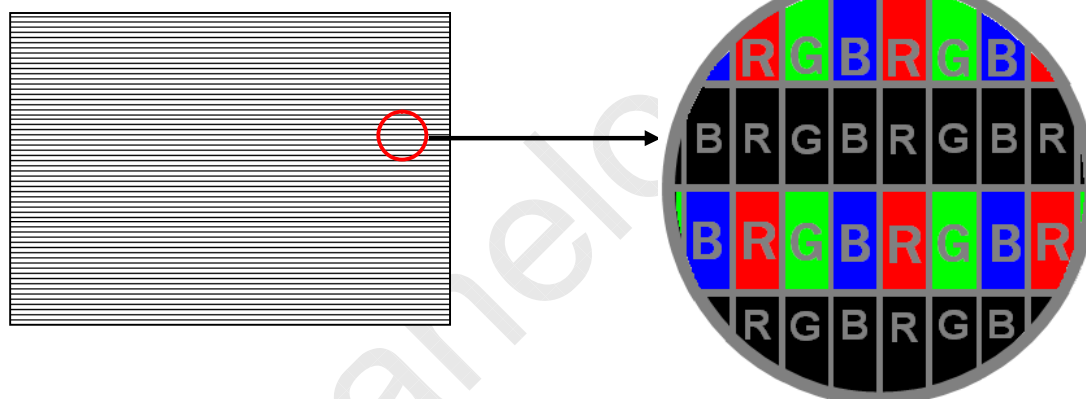
Active Area

b. Black Pattern

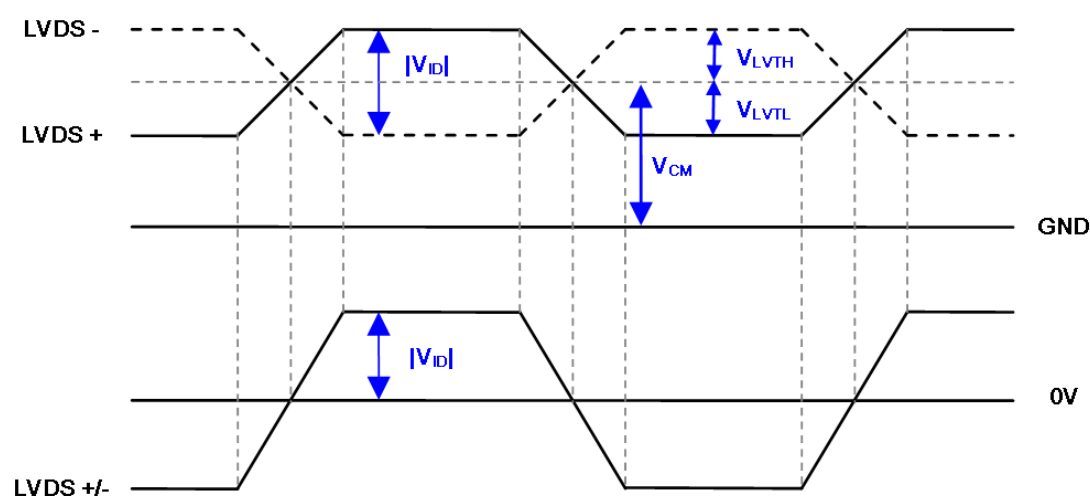


Active Area

c. Horizontal Pattern



Note (4) The LVDS input characteristics is as below :



3.2 BACKLIGHT UNIT

3.2.1 LED LIGHT BAR CHARACTERISTICS

The backlight unit contains 5 pcs LED light bar, and each light bar has 1 string LED.

(Ta = 25 ± 2 °C)

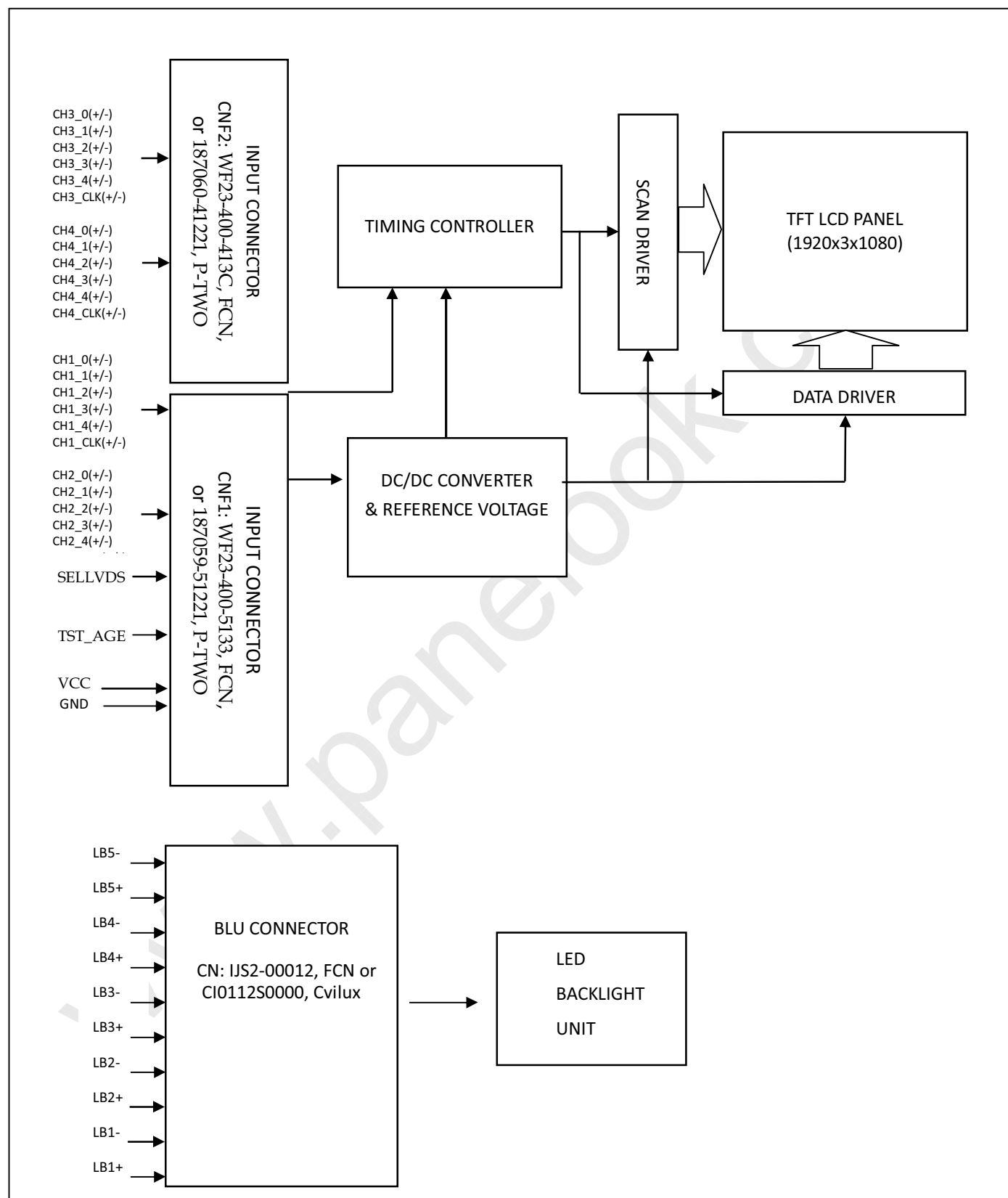
| Parameter | Symbol | Value | | | Unit | Note |
|------------------------------|-----------------|--------|---------|--------|-----------------|---|
| | | Min. | Typ. | Max. | | |
| One String Current | I _L | 159.8 | 170 | 180.2 | mA | |
| One String Voltage | V _W | 132.48 | 148.005 | 163.53 | V _{DC} | I _L =170mA |
| One String Voltage Variation | △V _W | - | - | 2.95 | V | For 1 BLU I _L =170mA |
| Power Consumption | P _{BL} | 118.25 | 125.8 | 133.35 | W | Only LEDs Duty=100% I _L =170mA |
| Life time | - | 30,000 | - | - | Hrs | (1) |

Note (1) The lifetime is defined as the time which luminance of the LED decays to 50% compared to the initial value,

Operating condition: Continuous operating at Ta = 25±2°C, I_L =170mA.

4. BLOCK DIAGRAM OF INTERFACE

4.1 TFT LCD MODULE



**5.INPUT TERMINAL PIN ASSIGNMENT****5.1 TFT LCD MODULE**

CNF1 Connector Pin Assignment (WF23-400-5133, FCN or 187059-51221, P-TWO)

| Pin | Name | Description | Note |
|-----|---------|--|----------|
| 1 | N.C. | No Connection | (1) |
| 2 | N.C. | No Connection | (1) |
| 3 | N.C. | No Connection | (1) |
| 4 | N.C. | No Connection | (1) |
| 5 | N.C. | No Connection | (1) |
| 6 | N.C. | No Connection | (1) |
| 7 | SELLVDS | Input signal for LVDS Data Format Selection | (2), (3) |
| 8 | N.C. | No Connection | (1) |
| 9 | N.C. | No Connection | |
| 10 | N.C. | No Connection | |
| 11 | GND | Ground | |
| 12 | CH1[0]- | First pixel Negative LVDS differential data input. Pair 0 | (4) |
| 13 | CH1[0]+ | First pixel Positive LVDS differential data input. Pair 0 | |
| 14 | CH1[1]- | First pixel Negative LVDS differential data input. Pair 1 | |
| 15 | CH1[1]+ | First pixel Positive LVDS differential data input. Pair 1 | |
| 16 | CH1[2]- | First pixel Negative LVDS differential data input. Pair 2 | |
| 17 | CH1[2]+ | First pixel Positive LVDS differential data input. Pair 2 | |
| 18 | GND | Ground | |
| 19 | CH1CLK- | First pixel Negative LVDS differential clock input. | (4) |
| 20 | CH1CLK+ | First pixel Positive LVDS differential clock input. | |
| 21 | GND | Ground | |
| 22 | CH1[3]- | First pixel Negative LVDS differential data input. Pair 3 | (4) |
| 23 | CH1[3]+ | First pixel Positive LVDS differential data input. Pair 3 | |
| 24 | CH1[4]- | First pixel Negative LVDS differential data input. Pair 4 | |
| 25 | CH1[4]+ | First pixel Positive LVDS differential data input. Pair 4 | |
| 26 | N.C. | No Connection | (1) |
| 27 | N.C. | No Connection | (1) |
| 28 | CH2[0]- | Second pixel Negative LVDS differential data input. Pair 0 | (4) |
| 29 | CH2[0]+ | Second pixel Positive LVDS differential data input. Pair 0 | |



| | | | |
|----|---------|--|-----|
| 30 | CH2[1]- | Second pixel Negative LVDS differential data input. Pair 1 | |
| 31 | CH2[1]+ | Second pixel Positive LVDS differential data input. Pair 1 | |
| 32 | CH2[2]- | Second pixel Negative LVDS differential data input. Pair 2 | |
| 33 | CH2[2]+ | Second pixel Positive LVDS differential data input. Pair 2 | |
| 34 | GND | Ground | |
| 35 | CH2CLK- | Second pixel Negative LVDS differential clock input. | (4) |
| 36 | CH2CLK+ | Second pixel Positive LVDS differential clock input. | |
| 37 | GND | Ground | |
| 38 | CH2[3]- | Second pixel Negative LVDS differential data input. Pair 3 | (4) |
| 39 | CH2[3]+ | Second pixel Positive LVDS differential data input. Pair 3 | |
| 40 | CH2[4]- | Second pixel Negative LVDS differential data input. Pair 4 | |
| 41 | CH2[4]+ | Second pixel Positive LVDS differential data input. Pair 4 | |
| 42 | N.C. | No Connection | (1) |
| 43 | N.C. | No Connection | (1) |
| 44 | GND | Ground | |
| 45 | GND | Ground | |
| 46 | GND | Ground | |
| 47 | N.C. | No Connection | (1) |
| 48 | VCC | +12V power supply | |
| 49 | VCC | +12V power supply | |
| 50 | VCC | +12V power supply | |
| 51 | VCC | +12V power supply | |



CNF2 Connector Pin Assignment (CNF2 : WF23-400-413C, FCN or 187060-41221, P-TWO)

| Pin | Name | Description | Note |
|-----|---------|--|------|
| 1 | N.C. | No Connection | (1) |
| 2 | N.C. | No Connection | |
| 3 | N.C. | No Connection | |
| 4 | N.C. | No Connection | |
| 5 | N.C. | No Connection | |
| 6 | N.C. | No Connection | |
| 7 | N.C. | No Connection | (1) |
| 8 | N.C. | No Connection | |
| 9 | GND | Ground | |
| 10 | CH3[0]- | Third pixel Negative LVDS differential data input. Pair 0 | (4) |
| 11 | CH3[0]+ | Third pixel Positive LVDS differential data input. Pair 0 | |
| 12 | CH3[1]- | Third pixel Negative LVDS differential data input. Pair 1 | |
| 13 | CH3[1]+ | Third pixel Positive LVDS differential data input. Pair 1 | |
| 14 | CH3[2]- | Third pixel Negative LVDS differential data input. Pair 2 | |
| 15 | CH3[2]+ | Third pixel Positive LVDS differential data input. Pair 2 | |
| 16 | GND | Ground | |
| 17 | CH3CLK- | Third pixel Negative LVDS differential clock input. | (4) |
| 18 | CH3CLK+ | Third pixel Positive LVDS differential clock input. | |
| 19 | GND | Ground | |
| 20 | CH3[3]- | Third pixel Negative LVDS differential data input. Pair 3 | (4) |
| 21 | CH3[3]+ | Third pixel Positive LVDS differential data input. Pair 3 | |
| 22 | CH3[4]- | Third pixel Negative LVDS differential data input. Pair 4 | |
| 23 | CH3[4]+ | Third pixel Positive LVDS differential data input. Pair 4 | |
| 24 | GND | Ground | |
| 25 | GND | Ground | |
| 26 | CH4[0]- | Fourth pixel Negative LVDS differential data input. Pair 0 | (4) |
| 27 | CH4[0]+ | Fourth pixel Positive LVDS differential data input. Pair 0 | |
| 28 | CH4[1]- | Fourth pixel Negative LVDS differential data input. Pair 1 | |
| 29 | CH4[1]+ | Fourth pixel Positive LVDS differential data input. Pair 1 | |
| 30 | CH4[2]- | Fourth pixel Negative LVDS differential data input. Pair 2 | |

| | | | |
|----|---------|--|-----|
| 31 | CH4[2]+ | Fourth pixel Positive LVDS differential data input. Pair 2 | |
| 32 | GND | Ground | |
| 33 | CH4CLK- | Fourth pixel Negative LVDS differential clock input. | (4) |
| 34 | CH4CLK+ | Fourth pixel Positive LVDS differential clock input. | |
| 35 | GND | Ground | |
| 36 | CH4[3]- | Fourth pixel Negative LVDS differential data input. Pair 3 | (4) |
| 37 | CH4[3]+ | Fourth pixel Positive LVDS differential data input. Pair 3 | |
| 38 | CH4[4]- | Fourth pixel Negative LVDS differential data input. Pair 4 | (4) |
| 39 | CH4[4]+ | Fourth pixel Positive LVDS differential data input. Pair 4 | |
| 40 | GND | Ground | |
| 41 | GND | Ground | |

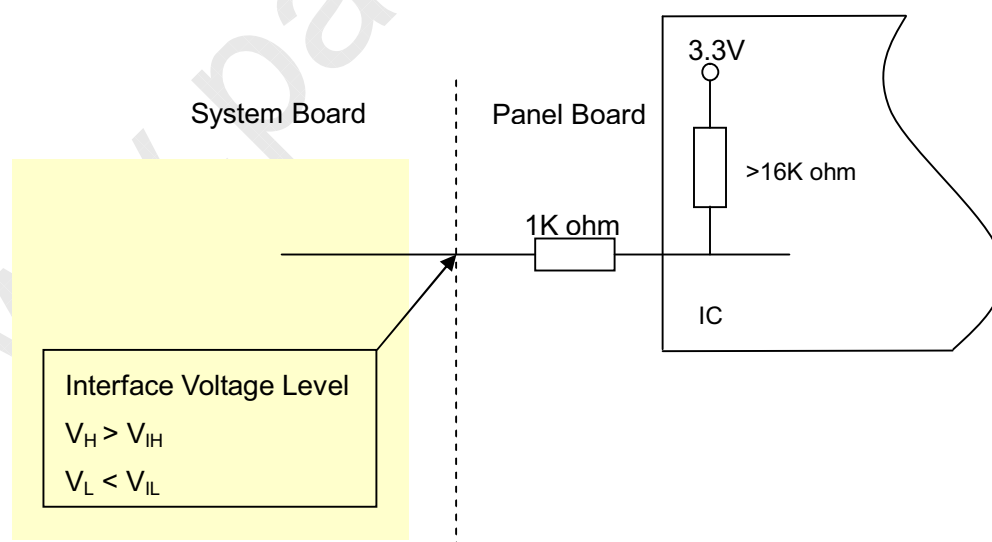
Note (1) Reserved for internal use. Please leave it open.

Note (2) LVDS format selection.

L= Connect to GND, H=Connect to +3.3V or Open

| SELLVDS | Note |
|-----------|--------------|
| L | JEIDA Format |
| H or Open | VESA Format |

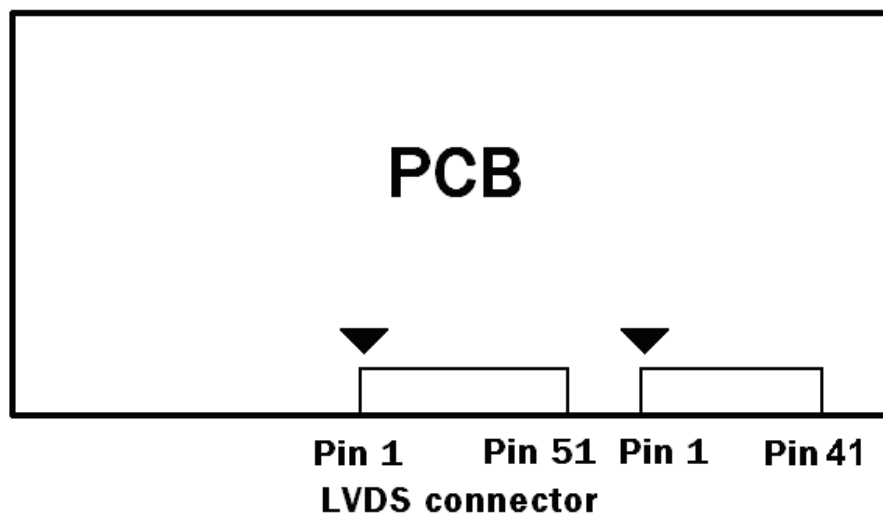
Note (3) Interface optional pin has internal scheme as following diagram. Customer should keep the interface voltage level requirement which including Panel board loading as below.



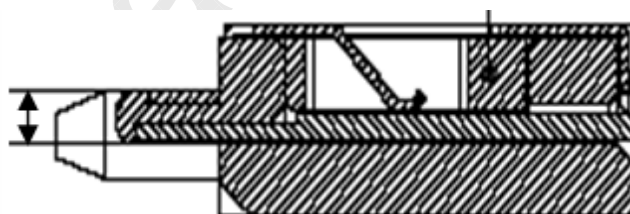
Note (4) LVDS 4-port data mapping

| Port | Channel of LVDS | Data Stream |
|----------|-----------------|--------------------------|
| 1st Port | First Pixel | 1, 5, 9,1913, 1917 |
| 2nd Port | Second Pixel | 2, 6, 10,1914, 1918 |
| 3rd Port | Third Pixel | 3, 7, 11,1915, 1919 |
| 4th Port | Fourth Pixel | 4, 8, 12,1916, 1920 |

Note (5) LVDS connector pin order defined as follows



Note (6) LVDS connector mating dimension range request is 0.93mm~1.0mm as below



**5.2 BACKLIGHT UNIT**

The pin configuration for the housing and leader wire is shown in the table below.

CN: JH2-01-122N (FCN)

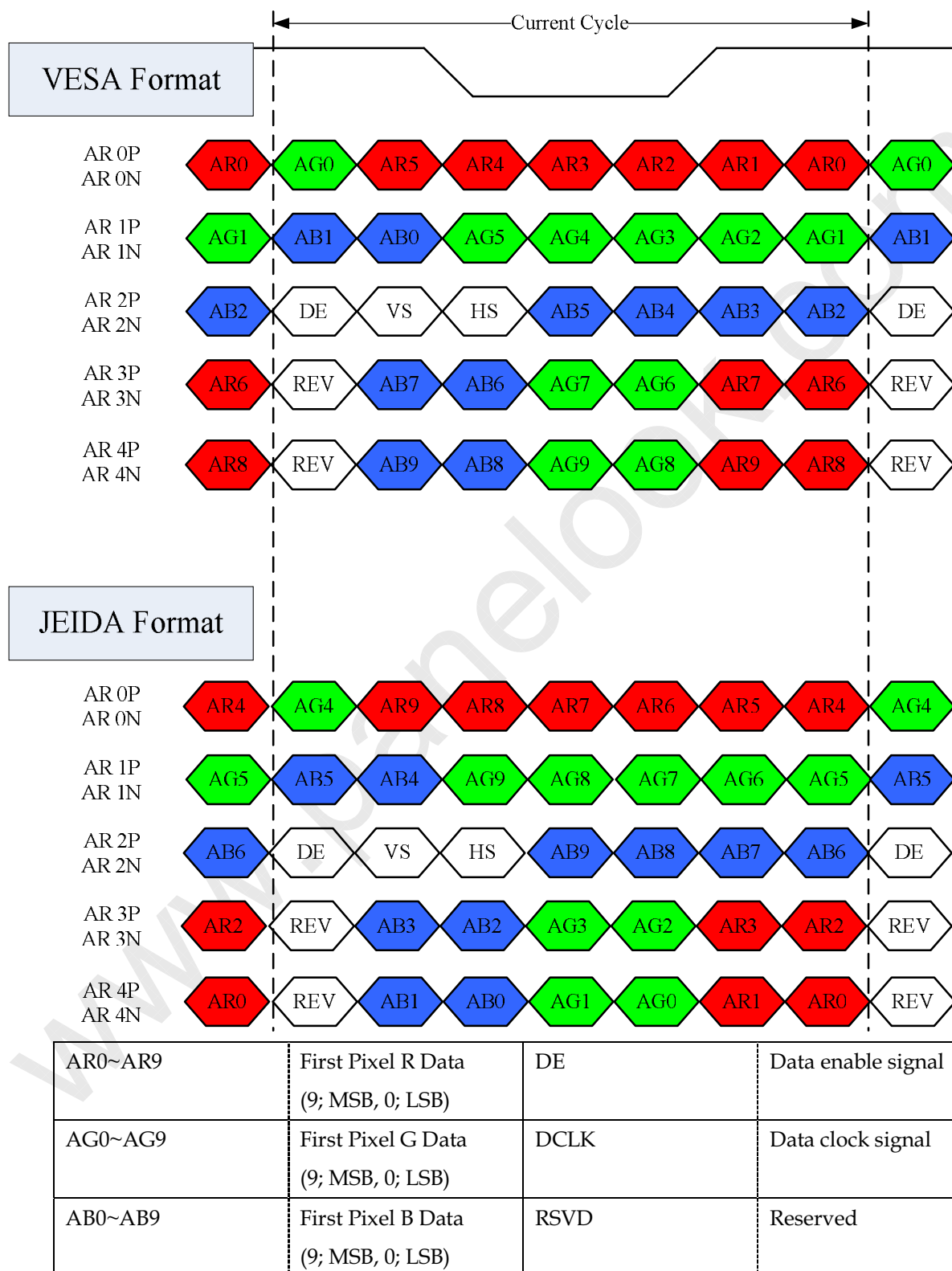
| Pin No | Symbol | Feature |
|--------|--------|-------------------------|
| 1 | LB5- | Negative of Light Bar 5 |
| 2 | LB4- | Negative of Light Bar 4 |
| 3 | LB3- | Negative of Light Bar 3 |
| 4 | LB2- | Negative of Light Bar 2 |
| 5 | LB1- | Negative of Light Bar 1 |
| 6 | NC | No Connection |
| 7 | NC | No Connection |
| 8 | LB5+ | Positive of Light Bar 5 |
| 9 | LB4+ | Positive of Light Bar 4 |
| 10 | LB3+ | Positive of Light Bar 3 |
| 11 | LB2+ | Positive of Light Bar 2 |
| 12 | LB1+ | Positive of Light Bar 1 |

5.3 LVDS INTERFACE

JEIDA Format : SELLVDS = L

VESA Format : SELLVDS = H or Open

VESA LVDS format





5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 10-bit gray scale data input for the color. The higher the binary input the brighter the color. The table below provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|------------------|-------------|----|----|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|----|----|
| | | Red | | | | | | | | | | Green | | | | | | | | | | Blue | | | | | | | | | |
| | | R9 | R8 | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G9 | G8 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B9 | B8 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale Of Red | Red (0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Red (1021) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (1022) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Red (1023) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Gray Scale Of Green | Green (0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Green (1021) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (1022) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green (1023) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Gray Scale Of Blue | Blue (0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Blue (1021) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue (1022) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| Blue (1023) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

Note (1) 0: Low Level Voltage , 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

(Ta = 25 ± 2 °C)

The input signal timing specifications are shown as the following table and timing diagram.

| Signal | Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---------------------------|--------------------------------------|------------------------|-----------------|-------|-----------------|------|------|
| LVDS Receiver Clock | Frequency | F_{clkin} (=1/TC) | 60 | 74.25 | 80 | MHz | |
| | Input cycle to cycle jitter | T_{rcl} | - | - | 200 | ps | (3) |
| | Spread spectrum modulation range | F_{clkin_mod} | $F_{clkin}-2\%$ | - | $F_{clkin}+2\%$ | MHz | (4) |
| | Spread spectrum modulation frequency | F_{SSM} | - | - | 200 | KHz | |
| LVDS Receiver Data | Receiver Skew Margin | T_{RSKM} | -400 | - | 400 | ps | (5) |

6.1.1 Timing spec for Frame Rate = 100Hz

| Signal | Item | | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---------|---------|----------|------|------|------|------|---------------------|
| Frame rate | 2D mode | | F_{r5} | 94 | 100 | 106 | Hz | (6), (7) |
| Vertical Active Display Term | 2D Mode | Total | T_v | 1090 | 1350 | 1395 | Th | $T_v=T_{vd}+T_{vb}$ |
| | | Display | T_{vd} | 1080 | 1080 | 1080 | Th | — |
| | | Blank | T_{vb} | 10 | 270 | 315 | Th | — |
| Horizontal Active Display Term | 2D Mode | Total | T_h | 520 | 550 | 670 | Tc | $T_h=T_{hd}+T_{hb}$ |
| | | Display | T_{hd} | 480 | 480 | 480 | Tc | — |
| | | Blank | T_{hb} | 40 | 70 | 190 | Tc | — |

6.1.2 Timing spec for Frame Rate = 120Hz

| Signal | Item | | Symbol | Min. | Typ. | Max. | Unit | Note |
|---------------------------------------|---------|---------|----------|------|------|------|------|---------------------|
| Frame rate | 2D mode | | F_{r6} | 114 | 120 | 126 | Hz | (6), (7) |
| Vertical Active Display Term | 2D Mode | Total | T_v | 1090 | 1125 | 1395 | Th | $T_v=T_{vd}+T_{vb}$ |
| | | Display | T_{vd} | 1080 | 1080 | 1080 | Th | — |
| | | Blank | T_{vb} | 10 | 45 | 315 | Th | — |
| Horizontal Active | 2D Mode | Total | T_h | 520 | 550 | 670 | Tc | $T_h=T_{hd}+T_{hb}$ |
| | | Display | T_{hd} | 480 | 480 | 480 | Tc | — |

| | | | | | | | | |
|--------------|--|-------|-----|----|----|-----|----|---|
| Display Term | | Blank | Thb | 40 | 70 | 190 | Tc | — |
|--------------|--|-------|-----|----|----|-----|----|---|

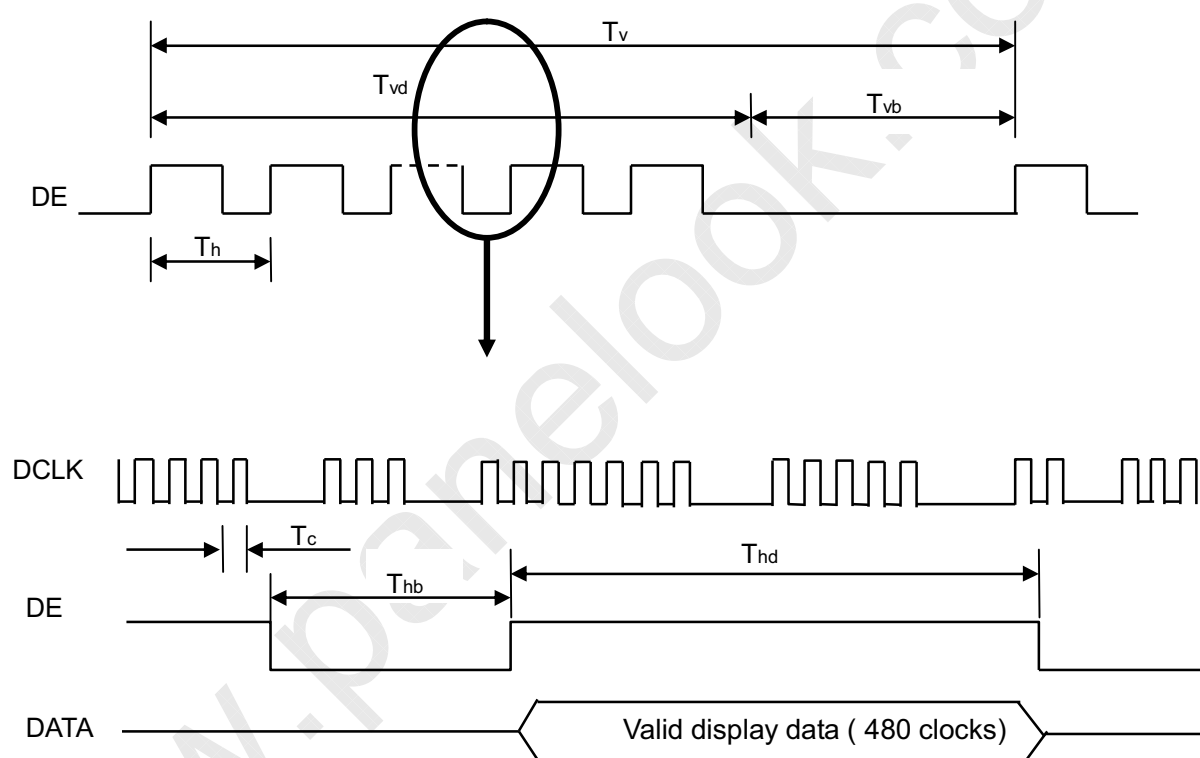
Note (1) Since the module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

Note (2) Please make sure the range of pixel clock has follow the below equation:

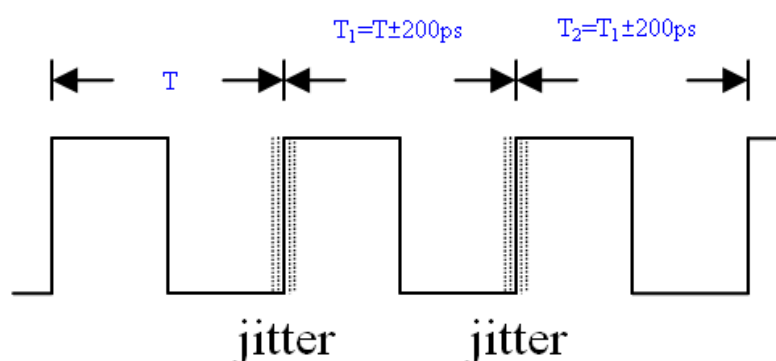
$$F_{clk}(max) \geq Fr6 \times Tv \times Th$$

$$Fr5 \times Tv \times Th \geq F_{clk}(min)$$

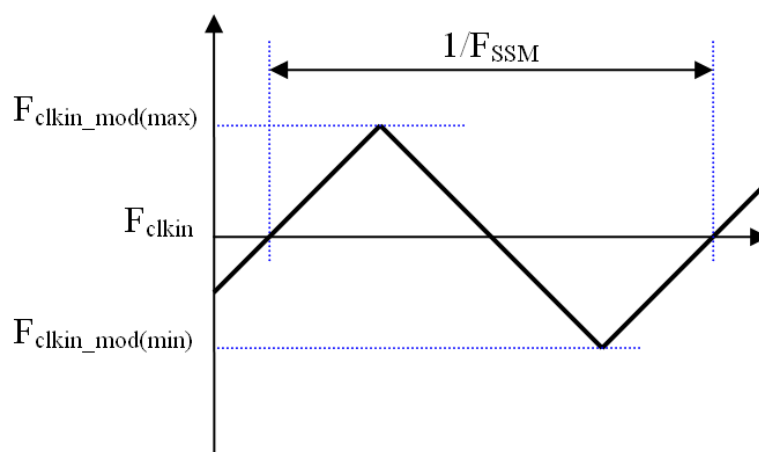
INPUT SIGNAL TIMING DIAGRAM



Note (3) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = I T_1 - T_I$

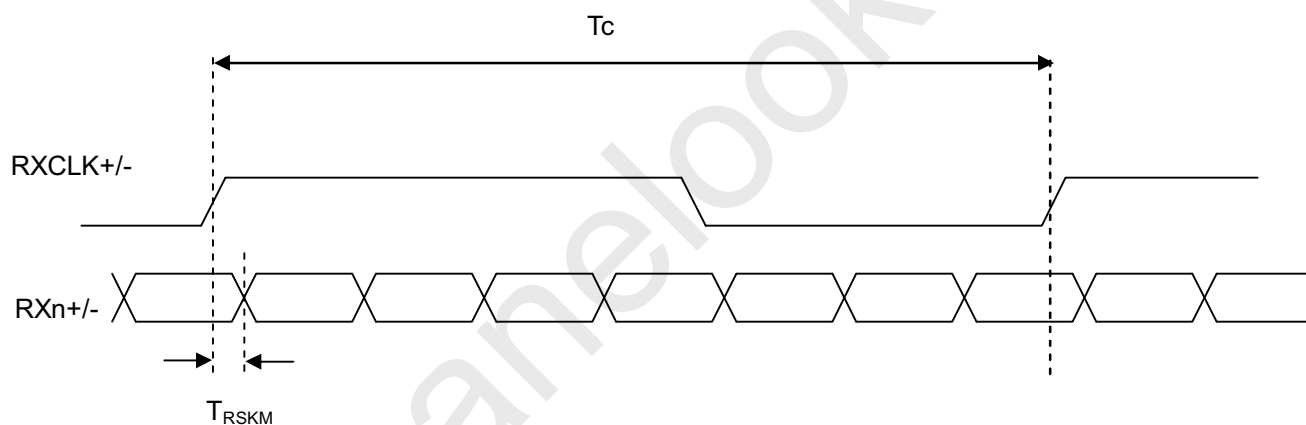


Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



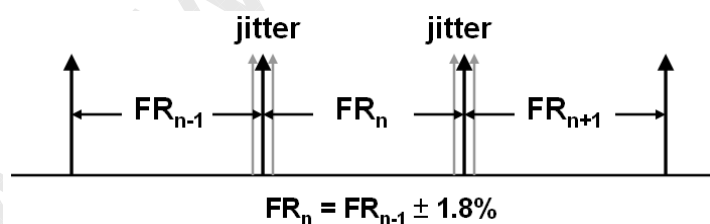
Note (5) LVDS receiver skew margin is defined and shown as below.

LVDS RECEIVER INTERFACE TIMING DIAGRAM



Note (6) The frame-to-frame jitter of the input frame rate is defined as the above figures. $FR_n = FR_{n-1} \pm 1.8\%$.

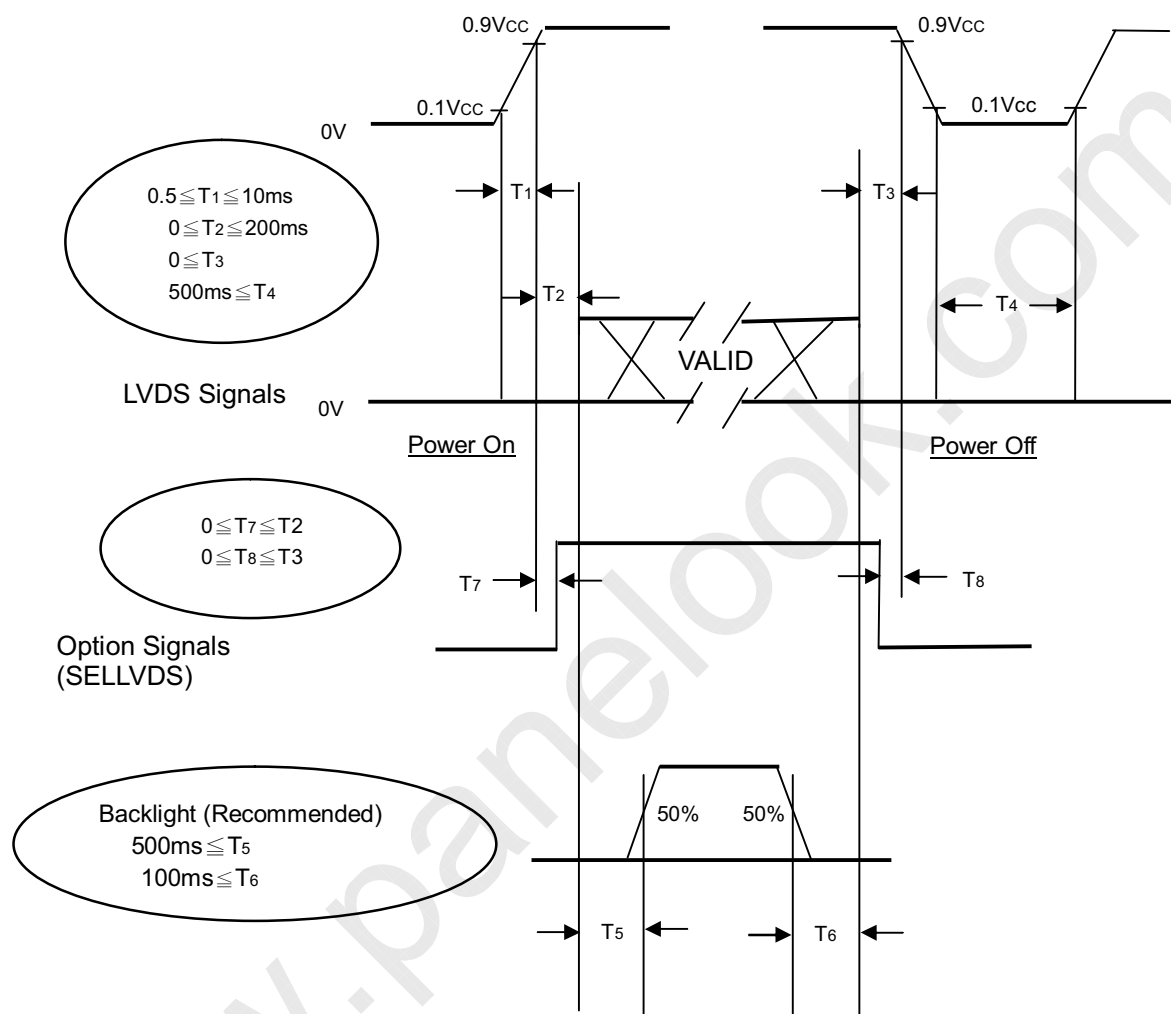
Note (7) The setup of the frame rate jitter $> 1.8\%$ may result in the cosmetic LED backlight symptom but the electric function is not affected.



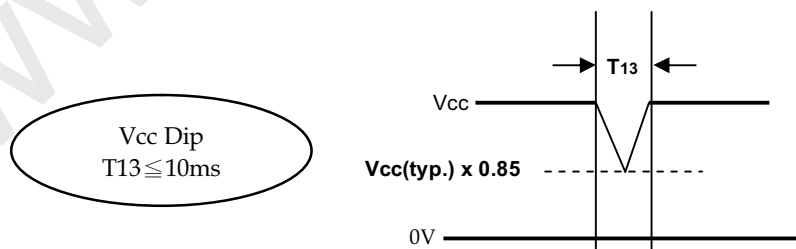
6.2 POWER ON/OFF SEQUENCE

($T_a = 25 \pm 2^\circ\text{C}$)

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence



Vcc Dip
 $T_{13} \leq 10\text{ms}$



Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the LED voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If $T_2 < 0$, that may cause electrical overstress failure.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

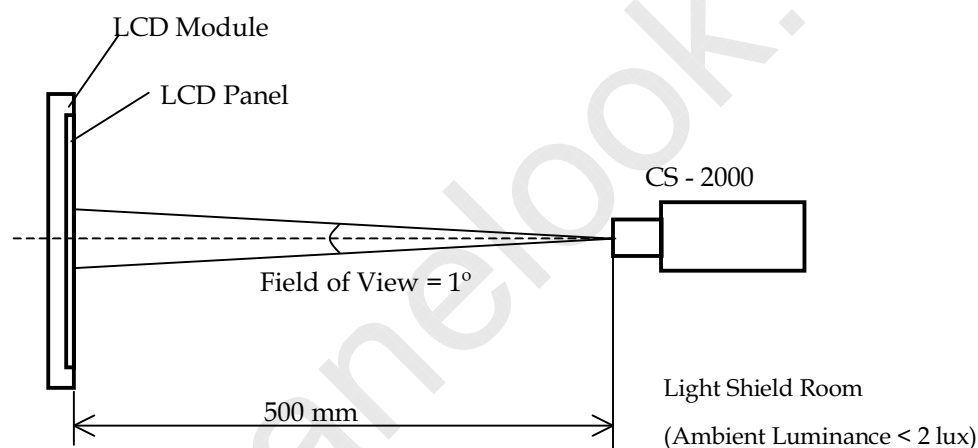
Note (6) Vcc must decay smoothly when power-off.

7. OPTICAL CHARACTERISTICS**7.1 TEST CONDITIONS**

| Item | Symbol | Value | Unit |
|---------------------|---|----------|------|
| Ambient Temperature | Ta | 25±2 | °C |
| Ambient Humidity | Ha | 50±10 | %RH |
| Supply Voltage | V _{CC} | 12±1.2 | V |
| Input Signal | According to typical value in "3. ELECTRICAL CHARACTERISTICS" | | |
| LED Current | I _L | 170±10.2 | mA |
| Vertical Frame Rate | Fr | 120 | Hz |

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring in a windless room.

Local Dimming Function should be Disable before testing to get the steady optical characteristics (According to 5.1 CNF1 Connector Pin Assignment, Pin no. "42")



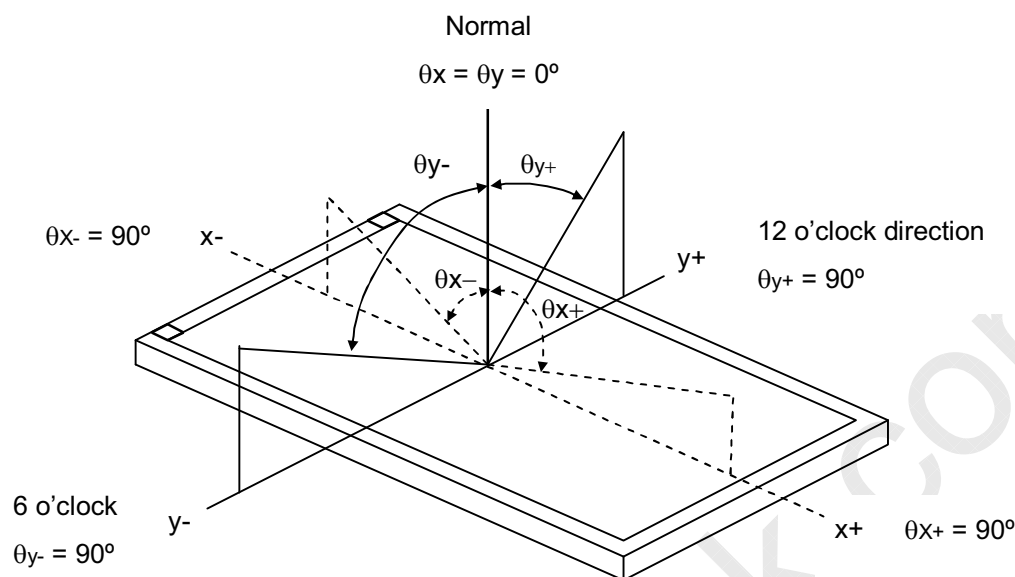
**7.2 OPTICAL SPECIFICATIONS**

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in 7.1.

| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---------------------------|------------------------------|------------------|---|---------------|-------|---------------|-------------------|------|
| Contrast Ratio | | CR | $\theta_x=0^\circ, \theta_Y=0^\circ$ Viewing angle at normal direction | 2800 | 4000 | - | - | (2) |
| Response Time | | Gray to gray | | | 6.5 | 13 | ms | (3) |
| Center Luminance of White | | L _C | | 280 | 350 | - | cd/m ² | (4) |
| White Variation | | δW | | | | 1.3 | - | (6) |
| Cross Talk | | CT | | - | | 4 | % | (5) |
| Color Chromaticity | Red | R _x | | Typ.- 0.03 | 0.622 | Typ.+ 0.03 | - | |
| | | R _y | | | 0.335 | | - | |
| | Green | G _x | | | 0.307 | | - | |
| | | G _y | | | 0.616 | | - | |
| | Blue | B _x | | | 0.149 | | - | |
| | | B _y | | | 0.055 | | - | |
| | White | W _x | | | 0.280 | | - | |
| | | W _y | | | 0.290 | | - | |
| | Correlated color temperature | | | | | | 10000 | |
| | Color Gamut | | | C.G. | - | 72 | - | % |
| Viewing Angle | Horizontal | θ _x + | CR≥20 | 80 | 88 | - | Deg. | (1) |
| | | θ _x - | | 80 | 88 | - | | |
| | Vertical | θ _y + | | 80 | 88 | - | | |
| | | θ _y - | | 80 | 88 | - | | |

Note (1) Definition of Viewing Angle (θ_x , θ_y) :

Viewing angles are measured by Autronic Conoscope Cono-80. (or Eldim EZ-Contrast 160R)



Note (2) Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance of L1023}}{\text{Surface Luminance of L0}}$$

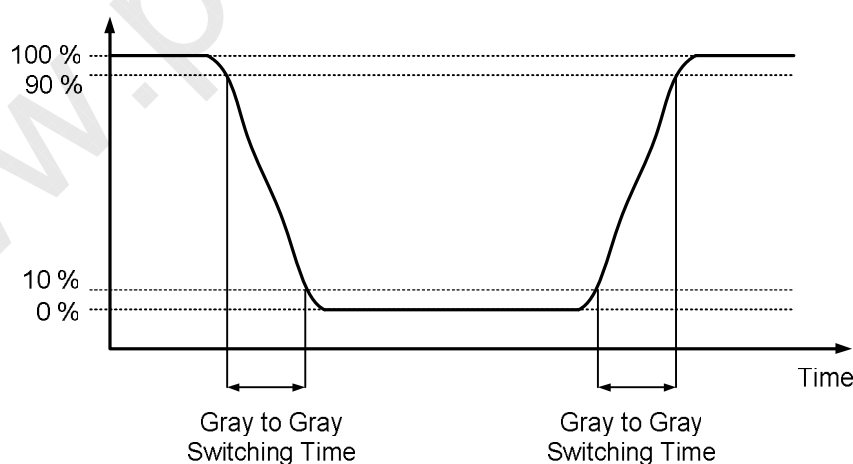
L1023: Luminance of gray level 1023

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (3) Definition of Gray-to-Gray Switching Time :

Optical Response



The driving signal means the signal of gray level 0, 124, 252, 380, 508, 636, 764, 892 and 1023.

Gray to gray average time means the average switching time of gray level 0, 124, 252, 380, 508, 636, 764, 892 and 1023 to each other.

Note (4) Definition of Luminance of White (L_C) :

Measure the luminance of gray level 1023 at center point.

$L_C = L(5)$, where $L(x)$ is corresponding to the luminance of the point X at the figure in Note (6).

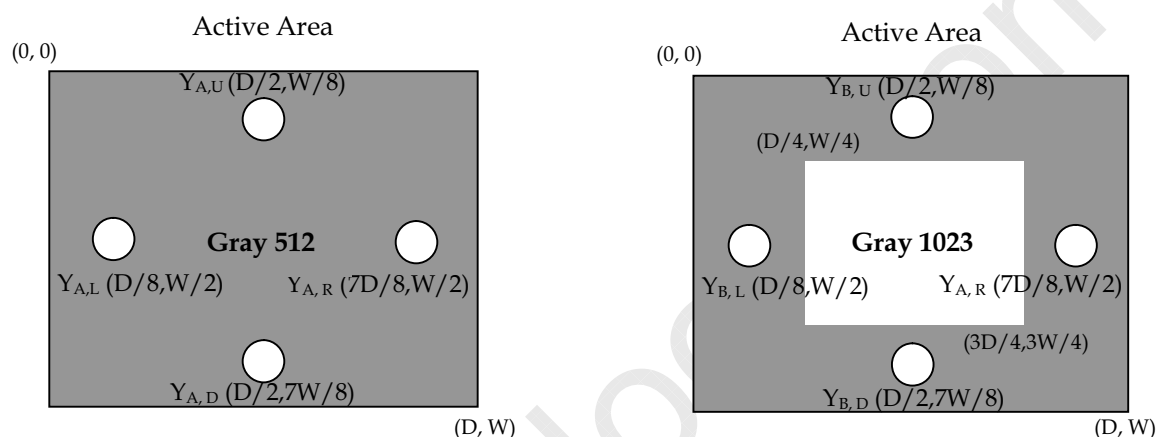
Note (5) Definition of Cross Talk (CT) :

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where :

Y_A = Luminance of measured location without gray level 1023 pattern (cd/m²)

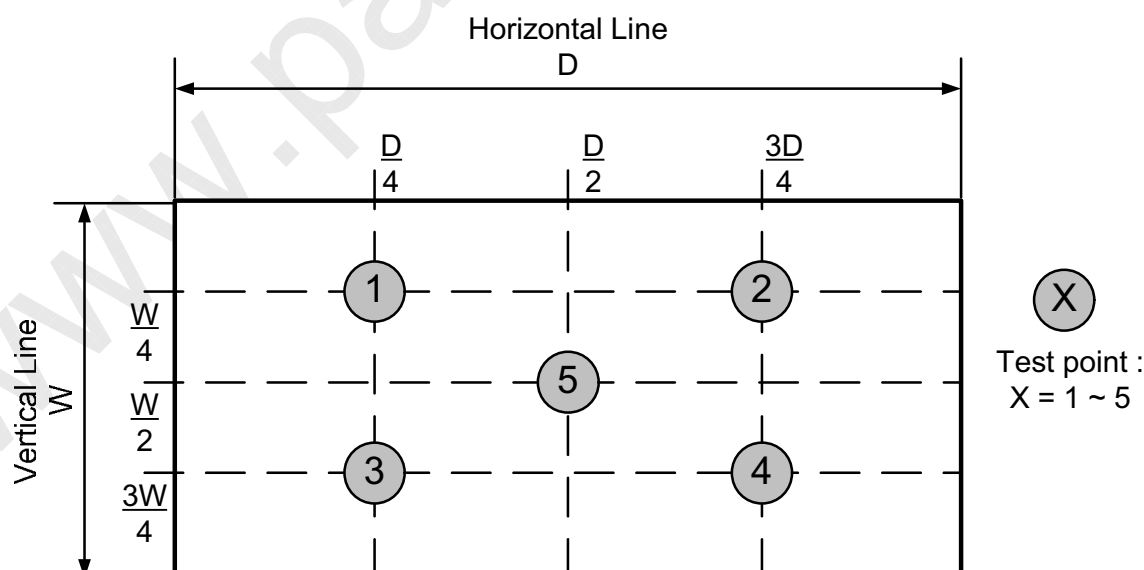
Y_B = Luminance of measured location with gray level 1023 pattern (cd/m²)



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 1023 at 5 points

$$\delta W = \frac{\text{Maximum } [L(1), L(2), L(3), L(4), L(5)]}{\text{Minimum } [L(1), L(2), L(3), L(4), L(5)]}$$





8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of LED will be higher than that of room temperature.

8.2 SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.

8.3 SAFETY STANDARDS

The LCD module should be certified with safety regulations as follows:

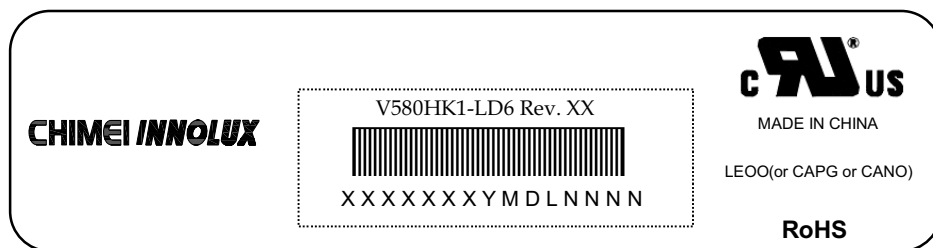
| Regulatory | Item | Standard |
|----------------------------------|------|---|
| Information Technology equipment | UL | UL60950-1:2nd Ed.,2011 |
| | cUL | CAN/CSA C22.2 No.60950-1-07,2nd Ed.,2011 |
| | CB | IEC60950-1:2005+A1:2009/ EN60950-1:2006+A11:2009+ A1:2010+A12:2011 |
| Audio/Video Apparatus | UL | UL60065 Ed.7:2007 |
| | cUL | CAN/CSA C22.2 No.60065-03:2006 + A1:2006 |
| | CB | IEC60065:2001+ A1:2005 +A2:2010 / EN60065:2002 + A1:2006 + A11:2008+A2:2010+A12:2011 |

If the module displays the same pattern for a long period of time, the phenomenon of image sticking may be occurred.

9. DEFINITION OF LABELS

9.1 CMI MODULE LABEL

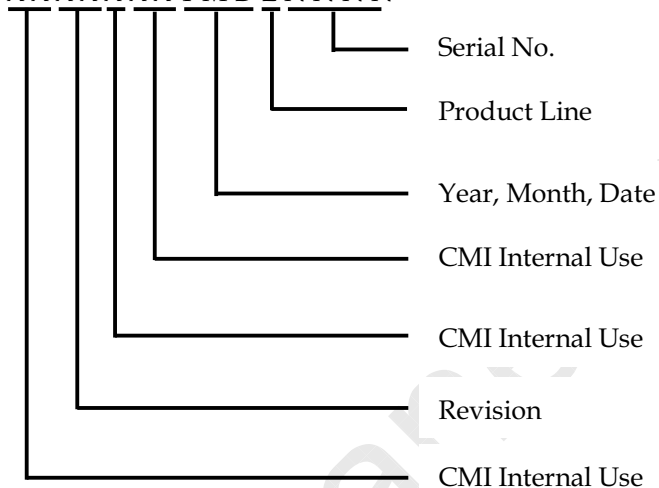
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



Model Name: V580HK1-LD6

Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.

Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

Manufactured Date:

Year : 2001=1, 2002=2, 2003=3, 2004=4...2010=0, 2011=1, 2012=2...

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I, O, and U.

Revision Code : Cover all the change

Serial No. : Manufacturing sequence of product

Product Line : 1 → Line1, 2 → Line 2, ...etc.

10. PACKAGING

10.1 PACKAGING SPECIFICATIONS

- (1) 3 LCD TV modules / 1 Box
- (2) Box dimensions: 1448(L) X 283 (W) X 846 (H)
- (3) Weight: approximately 60 Kg (3 modules per box)

10.2 PACKAGING METHOD

Packaging method is shown in following figure 10-1, figure 10-2

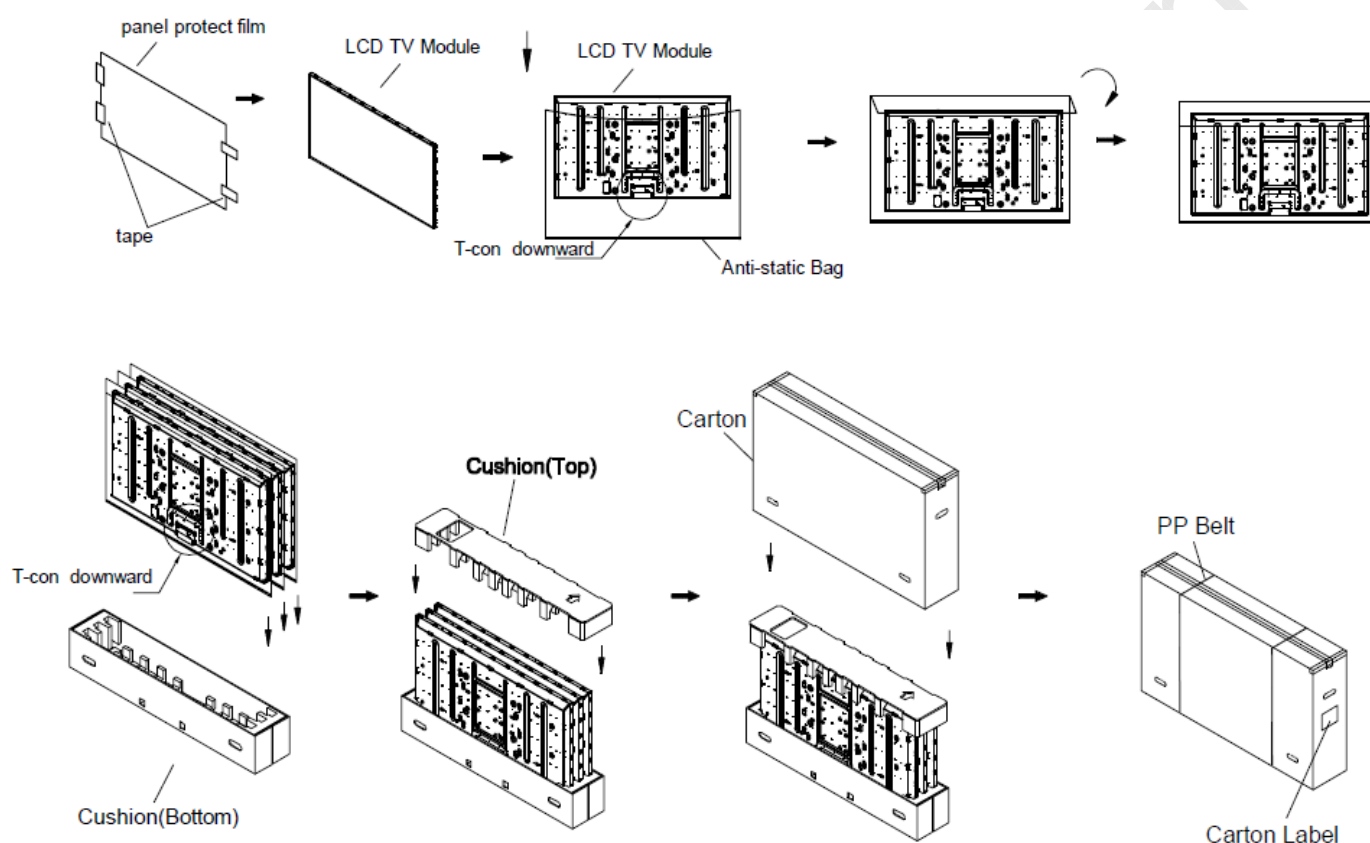
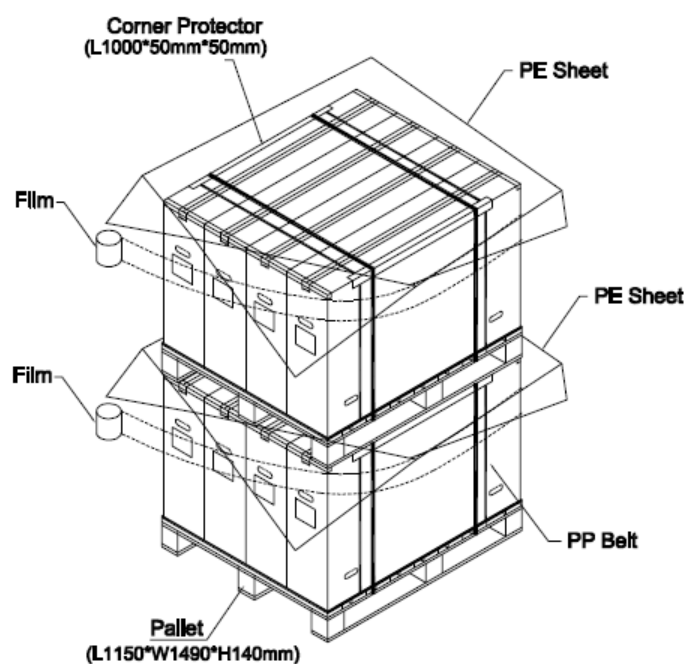


Figure 10-1



Sea / Land Transportation (40ft & 40ft HQ Container)



Air Transportation

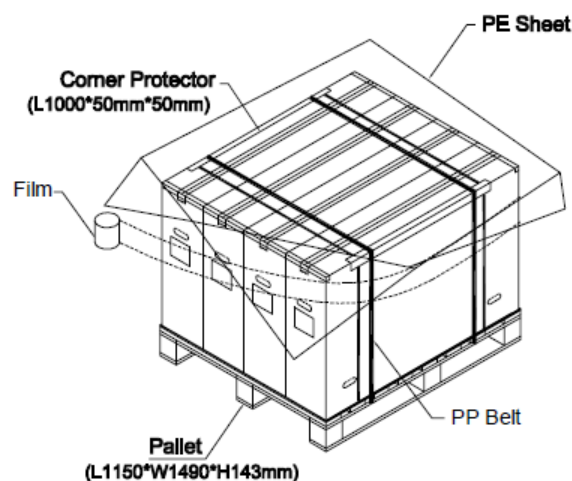
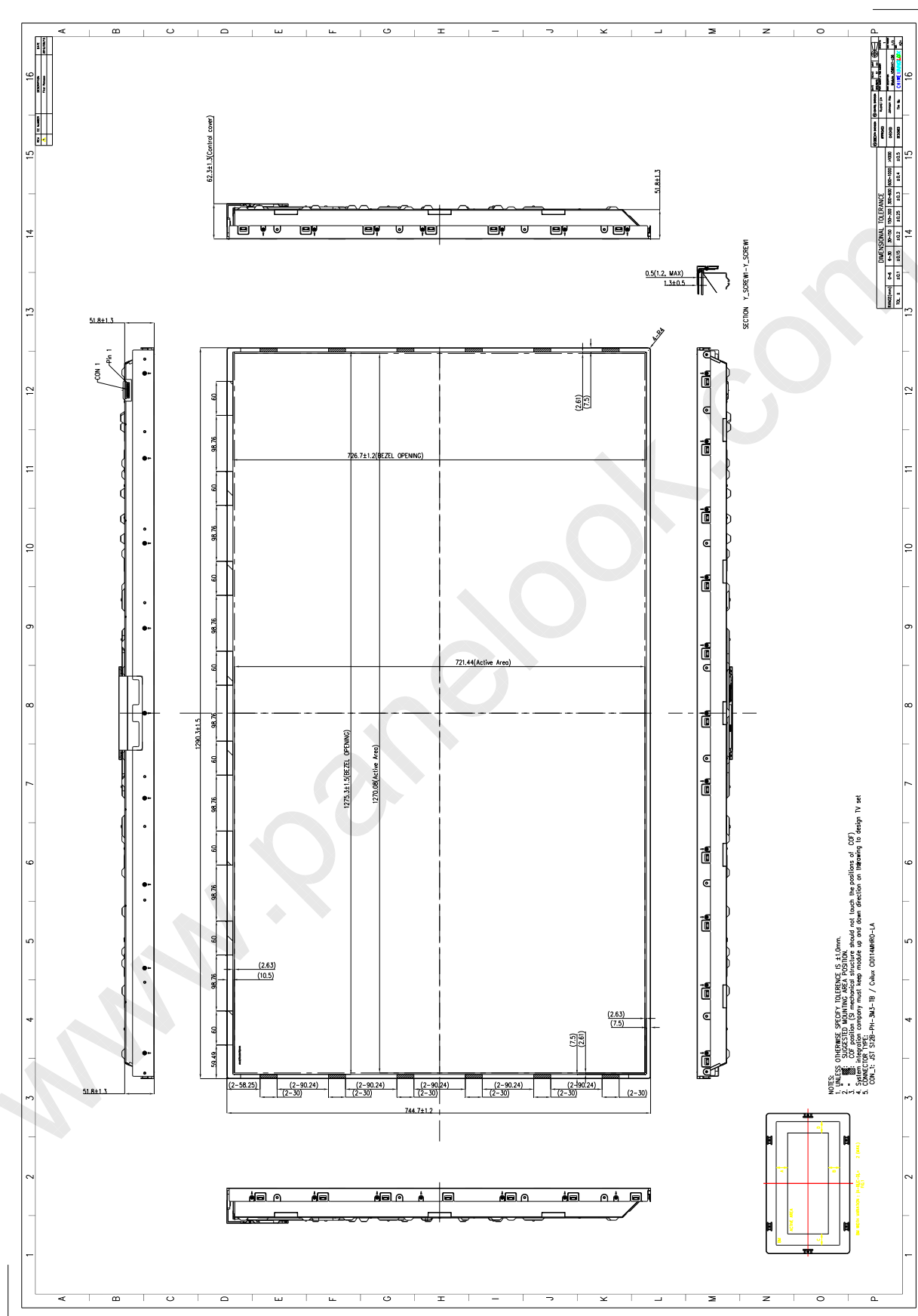


Figure 10-2

11. MECHANICAL CHARACTERISTIC



Version 2.0

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Date : Oct. 12 2012

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